OVERSIGHT SUMMARY
NOVEMBER 2-11, 1997
FEBRUARY 8-13, 1998

H.5
2/98

EPA/ARCS V
BVSPC Oversight Summary

Reporting Period: November 2 through 11, 1997, and February 8 through 13, 1998
Hours Worked: 229
Site Name/Location: American Chemical Services, Inc., Griffith, Indiana
BVSPC Project No.: 46517/46518.238
EPA Work Assignment Manager: Ms. Sheri Bianchin, RPM
Project Manager: Mr. Steve Mrkvicka

Personnel Summary Affiliation	No. of Personnel	Responsibility
Michael Hirt, Montgomery Watson, Addison, IL	1	Respondent's engineering consultant, onsite geologist
Ken, Mark, Mike, Vince, and Bob Layne Northeast Drilling Co., Milwaukee, WI	5	Contracted drillers to perform downhole geophysical logging and well abandonments and installations
Steve Mrkvicka (11/2-7, 1997) Kevin Brown (11/7-11, 1997) Carter Helm (2/8-13, 1998) BVSPC personnel	3	EPA oversight contractor

Summary of field activities

Well abandonments at the ACS site took place during two separate shifts (November 2 through 11, 1997, and February 8 through 13, 1998) to accommodate driller logistic and scheduling issues and to allow minimum production disruptions at the active ACS facility because utility and production line decommissioning and re-connections were required during the ACS production well abandonments.

Steve Mrkvicka, BVSPC-Chicago, conducted technical oversight during production well abandonment activities performed from November 2 through 7, 1998. The drill crew began work by removing the pumps from the production wells. The pump assemblies in wells IW-1, IW-2, IW-3, and IW-4, which were deep bedrock wells, were removed. Production wells IW-5 and IW-6 were shallower Lower Aquifer wells. After the pumps were removed, two crews followed behind to conduct downhole logging activities. One crew performed caliper and gamma logging, and the

other crew performed television camera logging. The logging activities were performed to determine the condition of the steel well casing, the depth to the bottom of the casing, the lithologies of the geologic materials behind the casing, and the diameter of the open hole in the bedrock. The logging activities occurred as described in the well abandonment Specific Operating Procedure (SOP).

The data collected during the logging activities were used to assist in determining the depth to the place the packer assembly that were used to sample groundwater. The purpose for using the packer assembly was to collect a discrete groundwater sample from the base of the steel casing. The results of the sample analysis would indicate if contamination had leaked downward from the highly contaminated Upper Aquifer into the Lower Aquifer or the bedrock aquifer along the outside of the casing. The following information was determined:

Well	Well Depth (below TOC)	Water Depth (below TOC)	Sample Date	Split Collected?
IW-1	245 feet	16.85 feet	11-4-97	Yes
IW-2	267 feet	18.43 feet	11-3-97	No
IW-3	255 feet	17.67 feet	11-2-97	No
IW-4	305 feet	16.68 feet	11-4-97	Yes
IW-4D			11-5-97	Yes
IW-5	obstruction	4.91 feet	NA	No
IW-6	obstruction(?)	18.91 feet	11-5-97	Yes

It was noted that the sample collected from IW-3 was not collected in accordance with the SOP. The sample was mistakenly collected directly from the Hydrolab, which is the instrument used to measure water quality parameters during purging. The SOP required that the Hydrolab must be disconnected before collecting the sample. Two samples were collected from IW-4. The first sample, dated November 4, 1997, and labelled IW-4, took a long time to collect because the packer assembly was set across an apparent shale zone just below the base of the well casing. The second sample, dated November 5, 1997, and labelled IW-4D, was collected from the zone just below the shale interval.

After sampling activities were completed, the drill crew began to grout the wells in accordance with the well abandonment SOP. The downhole logs indicated the well depths and the depth to the top of the clay confining layer that separated

propane torches before activities such as drilling mud circulation or grouting could resume.

One driller became seriously ill after drilling at the IW-5 location. Odors were present but no organic volatile was detected with the HNu. The driller was hospitalized and subsequent testing revealed scarred lung tissue (linear actectosis) which occurs during or post pneumonia episodes. This condition was most likely not site related, but blood was drawn to measure if any site-related contaminates were present.

The use of plastic explosives to create perfs in well casing can be guess work as far as what exactly happens downhole. These perfs are supposed to create 0.5-inch holes with no pipe expansion; however, if the explosive is placed near the well seam or a well defect or area of weakness, as was the case at IW-5, casing expansion hinders the well abandonment process. For future well abandonment at IW-6, BVSPC recommends use of 1-inch pipe to collapse the bottom of the well to establish circulation, and if that fails, then use explosives. Michael Hirt, Montgomery Watson geologist, agreed. A delay of approximately 4 hours occurred at IW-5 due the unpredicted expansion of the well casing due to an uncontrolled perf.

No protective top was installed at MW-54R; however, the drillers used the 8-inch surface casing to act as a pro-top. The 2-inch well riser was cut 24 inches above ground surface and the well surface casing was placed to 26 inches above ground surface. Drillers then welded a flip top cover complete with a lock to satisfy well security requirements.

Although two new wells, MW-9R and MW-54R, were installed, well development did not occur immediately after well installation. Michael Hirt, Montgomery Watson geologist onsite, assured BVSPC personnel that development would occur before sampling, if not during the week of February 16, 1998. BVSPC will maintain contact with Montgomery Watson geologist Michael Hirt to ensure that proper development volumes are removed before well sampling. Approximately 350 to 400 gallons of drilling fluid/water/grout were "lost to formation" while drilling the two new wells. Three to five times this volume needs to be developed from the new wells in addition to five times the borehole annulus volume to meet the objectives of the EPA-approved well development SOP.

Signature:  Date: March 4, 1998

(10) SMHL 11-2-97

0745 arrive at the site. Layne Northwest Pewaukee, WI onsite Purpose of site visit is to perform the production well abandonment activities. Crew is completing Safety meeting.

0830 Move to IW3 to pull pump. Weather is cold breezy cloudy, about 40°F. Begin pulling piping from well.

0905 Photos (1) and (2) looking North at pump being pulled from the well.

0915 Sheri Shows up at site. Water level at 17.67 feet below TOC.

0930 Move to IW1 to begin pulling piping and pump. Geophysical logging truck shows up at IW3.

1005 Pull IW3 pump Photo (3) Looking South, Caliper tool installed at IW3

1030 Move to IW2 inside building

SMHL 11-2-97 (11)

by the office. Use extension cable through roof.

1105 Photo (4) of logging at IW3. Caliper done first then gamma tool. Looking North.

1115 Pull pump from IW2 Photo (5) Inside building.

1130 Logging at IW3 with TV camera. Observe joints at 69' and 90' below TOC that appear to be leaking.

1300 Break for lunch. Need to clean out casing because it's covered with precipitation. Problem because there's no tool onsite to do it. Video camera moved to IW2

1400 Return back from lunch. Taping with TV camera at IW2.

1500 Move packer assembly to IW3.

1515 Photo (6) of packer assembly lowering into IW3

1555 Complete lowering packer

(72) SMHL 1-2-97

assembly
1610 Completed video taping at IW2. Beginning to run caliper
1730 Completed low flow sampling. Leave site.

SMHL 1-3-97 (73)

0700 Arrive at office to get EPA paperwork for split sampling. Sheri directed me to collect split samples at IW1, 4, 5 and 6. To leave messages with Cellia some about lab space.
0730 Leave office for the site
0820 Arrive at site. Go to treatment bldg to collect bottles for split samples.
0915 Meet Layne crew at IW2 inside bldg where they are setting up packer assembly to sample this second well. TV camera is logging IW4
1010 Photos (7) and (8) show geophysical logging at IW1 near RR tracks at south end of ONSCA. TV logging at IW4 indicates hole depth is 302 feet below TOC. Crew still working on installing packer into IW2.
1035 I copy water level data on wells IW1 thru IW4 (feet below TOC)
IW1 - 16.85 IW-2 18.43 IW3 17.67

(74) SWMH 11-3-97

IW4 16.68

1205 Mike Hirt, Monti Watson, is collecting water samples from IW2 inside bldg. Luanne Vandegrift, US EPA notes that samples are to be collected from the pump directly and not from the Hydrolab. Note that sample collected yesterday from IW3 was collected from the Hydrolab.

1230 Finish sampling and break for lunch.

1330 Return to site. Crew is breaking down packer assembly.

1350 Photo (9) shows TV logging van at IW1. Pete Vagt onsite

1415 IW5 water level 4.91' below TOC. Water level indicator inserted doesn't show sheen. Oil water probe inserted doesn't show oil or product. Inserted probe showed a sawdust type material, that is gritty. Photo (10) shows material at end of the probe. Clay soft obstruction at about 9.9' below TOC

SWMH 11-3-97 (75)

1540 Use PVC pipe and tremie to push obstruction down into IW5.

1555 Begin bailing IW5 to see if well can be drawn down.

1645 Finish bailing, leave site.

(76) SMK 11-4-97

800 arrive at site. Crew installing packer into IW4. Begin setting up sampling equipment

0845 Photo (11) shows sampling at IW4 looking Southwest. Purging of water before sampling begins. Water quality parameters

~~IW4~~	T(°C)	Cond.	pH	turb.
IW4	11.92	0.286	7.57	-
	11.42	0.287	7.57	83.4
	11.21	0.286	7.57	83.0
	11.11	0.286	7.57	77.6
	10.84	0.286	7.57	71.2
	10.87	0.286	7.57	74.5
IW3	12.36	0.290	7.31	14.6
(11-2-97)	11.60	0.285	7.43	27.3
	11.58	0.284	7.44	23.8
	11.51	0.285	7.44	22.6
	11.53	0.284	7.44	22.7
	11.49	0.283	7.44	21.8

0910 Sample IW4

1010 At about this time the water stops flowing and so the well is allowed to recharge.

SMK 11-4-97 (77)

1100 Go to IW6. Remove cap and measure for free product with oil water interface probe. No product measured and no sheen observed on probe when it's removed. Ken will do geophysical logging at this well. Return to IW4 to finish sampling.

1130 Leave the site for lunch.

1240 Return from lunch. Sheri had asked if there was a Conflict of Interest concern regarding B&V's involvement at the site. I told her that there wasn't as far as I knew. She had a call from the Region VII CO and he had said the COI letter ~~said~~ indicated there was a check. I told Sheri that a copy of the letter would be faxed to her. Lab assignments are Region II CRL for inorganics and Metchem for organics (CLP lab)

1345 Still not enough water from IW4 to fill the remaining 80 oz amber jars. Metchem says they need 1 liter for analysis but are expecting

	T °C	Cond	pH	turb
IW2	12.52	0.949	7.26	14.5
	12.49	0.944	7.26	12.4
	12.31	0.941	7.27	12.1
	12.40	0.941	7.27	11.5
	12.45	0.942	7.27	11.0
	12.45	0.942	7.27	10.2
	12.45	0.942	7.27	9.9
	12.42	0.942	7.27	10.8

2 liters of sample in case they need to rerun the analyses. We will wait to try and get more volume for pesticide/PCBs and SVOCs.

1350 Photo (12) of Mike bailing IW6 next to office building. After bailing he will collect sample. Sheri told me that Ken had observed an obstruction in IW6 at about 30 feet below ground surface and then an oil sheen protruded to the surface during geophysical logging. Mike doesn't think there was anything in the groundwater.

1400 Move back to IW4 to try and collect the remaining sample for this

well. Collect enough from IW4 to complete sampling. Not enough to fill a 2 liter bottle, but close.

1430 Mike goes to IW6 to continue bailing while I go get some ice and baggies at the store.

1515 I finish and I'm back at site.

1530 Crew is at IW1 to begin installing packer assembly.

1630 Begin purging water.

VALUES NO GOOD BECAUSE HYDROLAB DISCONNECTED.

IW1	T °C	Cond	pH	turb
	~~12.32~~	~~0.215~~	~~7.30~~	
	~~12.42~~	~~0.227~~	~~7.28~~	
	~~9.49~~	~~0.013~~	~~7.98~~	
	~~9.18~~	~~0.012~~	~~8.02~~	
	~~8.93~~	~~0.013~~	~~8.05~~	
	~~8.61~~	~~0.014~~	~~8.08~~	
	~~8.41~~	~~0.012~~	~~8.09~~	
	~~8.25~~	~~0.013~~	~~8.12~~	
	10.98	0.314	8.40	30.5
	10.99	0.315	8.34	29.4
	11.00	0.316	8.31	29.7

Sample 1735

1830 Done sampling, leave site

(80) SMH 11-5-97

0715 Arrive at site. Crew is removing packer assembly from IW1. Geoff and Mike is preparing bottles for sampling. At Sheri's request, crew will go back to IW4D and sample the zone just below the shale (into the limestone). Mike will soon sample at IW6.

0750 Sample IW6

0810 Done sampling at IW6

0840 Measure water level at IW5. Water level at 62.98 feet below TOC. Level has not increased in 24 hours.

0915 After decontaminating the packer assembly, the crew is at IW4 to begin lowering the packer to sample a lower zone than was previously sampled. I fill out sample paperwork.

1015 Begin purging IW4
Due to no water in IW5, will not likely sample the well.

1035 Purge parameters.

1040 Collect sample at IW4D

1115 Done sampling. Begin paperwork.

SMH 11-5-97 (81)

IW4D	T °C	Cond	pH	turb.
	12.40	0.307	7.42	8.0
	12.45	0.307	7.43	4.8
	12.49	0.306	7.43	4.4
	12.51	0.307	7.43	4.5
	12.50	0.308	7.43	4.5

1230 Break for lunch.

1320 Back from lunch. Continue sample shipment stuff.
IW1 - GW02
IW4 - GW03
IW6 - GW01
IW4D - GW04

1340 Pour trip blank TB01

1400 Take water levels at numerous wells.

well	WL (TOC)	Sticky	Time	comment
M4D	11.40	-	1315	
IW4	16.96	5"	1416	
P32	6.32	-	1424	
IW3	17.72	15"	1427	
P-29	6.49	-	1433	
IW2	18.49	15 1/4"	1435	
IW1	16.78	2 7/8"	1443	
P36	10.00	-	1449	
P34	4.11	-	1454	

(82) SMRL 11-5-97

well	WL(TOC)	stickup	time	comment
IW6	18.91	22 3/8"	1506	
P39	6.05		1513	
MW7	19.60		1529	need lock
MW8	18.88		1552	no cap, need lock
MW9	17.10		1612	

1630 leave site.

SMRL 11-6-97 (83)

0730 arrive at site. Crew is setting up to begin grouting wells. Move to IW3 to begin the first well.

well	depth	clay bottom
IW1	245	47
IW2	247	47
IW3	255	35
IW4	305	32

Mixing 160 gallons of water with 10 bags of Portland cement and 4 bags of bentonite powder.

1015 Pump grout into the well. No water is displaced. Do not know if grout has come up into casing.

1105 Move off of IW3 and go to IW1. Unlikely to have grout up into the casing.

1150 Setting equipment at IW1. Break for lunch.

1310 Mix 7 bags cement and 1 bag bentonite powder into 160 gallon tub. Begin pumping grout. All goes into the hole but no water returns to

the surface. Complete grouting and flushing with water.

1905 Measure top of grout in IW3. Level at about 154 feet below ground surface. Will put a couple of bags of bentonite chips into the hole to try and plug off the seam at 154' bgs that is likely there.

1530 Sheri onsite. Poured bentonite chips up to 66 feet below ground surface. Crew will break down and stop for day. Leave site to drop off samples at CRL.

1620 Arrive at CRL and drop off samples.

0945 Arrive at the site. Crew is at IW4. Getting ready for grouting IW4. Crew poured bentonite chips into IW1 up to 65 feet below ground surface.

0815 Mixing cement and bentonite slurry. Photo (13) shows grout being mixed in the tub before transfering it into the well.

0930 Pour grouting IW4. Put 2 tubs of grout into well.

1100 Mixed grout at IW2 and begin pumping into the well. Photo (14) showing grout being pumped into IW2.

1130 Kevin Brown BVSPC Atlanta office onsite to take over oversight activities until job is complete. Talked to Tom Forman about ACS safety plan.

1145 Break for lunch to discuss project with Kevin.

1330 Back onsite. Crew is welding threaded nipples onto the top casing in preparation of the perforating activities. Kevin

(86) SWMU 11-7-97

and I inspect the offsite area where the covers have placed on the soil pile. All look in OK shape. Added 2 bags of bentonite chips into IW4 and IW2, then added 1 drum each of grout on top of the chips.

1530

1545 - K. Brown takes over logbook. Crew is loading up hoses, pump, drum, + tremmie pipe on truck to take to decon area.

1610 - Crew at decon area deconning equipment.

1630 - Leave site for day.

Kevin Brown 11/7/97

(87)

Saturday 11/8/97

0720 - K. Brown arrives on site. Weather is cool, overcast, steady breeze. ≈ 40° F.

0740 - Crew is at decon area preparing for today's work to include perforating well casings. Crew has ~~already~~ KB 11/8/97 already welded a threaded coupling onto the top of the casing @ IW1.

0800 - Crew moves to IW1 to prepare to make perforations. Depth to grout is 65 feet below top of casing. Depth to clay is 47 ft.

0825 - Crew adds 1/2 bag of Enviroplug chips.

0830 - Grout now up to 63 ft b.t.o.c. Crew adds rest of 50 lb bag of chips.

0835 - Grout now up to 55 ft below ground elevation.

0840 - Brown takes photo of perforating jet with detonator about to go into IW1

0842 - Crew sets off the charge at 52 ft below ground surface.

0855 - Crew sets up to blow 2 shots @ 45 ft b.g.s.

0905 - Crew set off two charges @ 45 ft b.g.s.

0915 - Crew prepares to set off another charge @ ~~51.0~~ 50.5 ft b.g.s.

Kevin Brown

11/8/97

0935 - Crew set off charge @ 50.5 ft b.g.s.
0940 - Crew discontinues blasting perforations and begins to set up to check for communication outside the casing.
0950 - ACS shuts off power to the Blending Body at the main breaker and locks and tags out the breaker.
1030 - Crew begins lowering the packer into IW1.
1040 - Top of packer is lowered to 45.5 ft below ground surface and will not lower further. Crew suspects that the explosives collapsed the casing.
1100 - No communication. Crew pulls out the packer to blow more perforations.
1200 - Crew has set off 2 more sets of 4 charges and there is an obstruction at 47 ft b.g.s. They are not sure if the obstruction is sand or bentonite coming up in the hole or a bulge in the pipe.
1230 - Crew decides to try to circulate water to try to clean out the well. Brown goes to lunch.
1300 - Brown onsite. Crew is circulating

Keri Brown

11/8/97

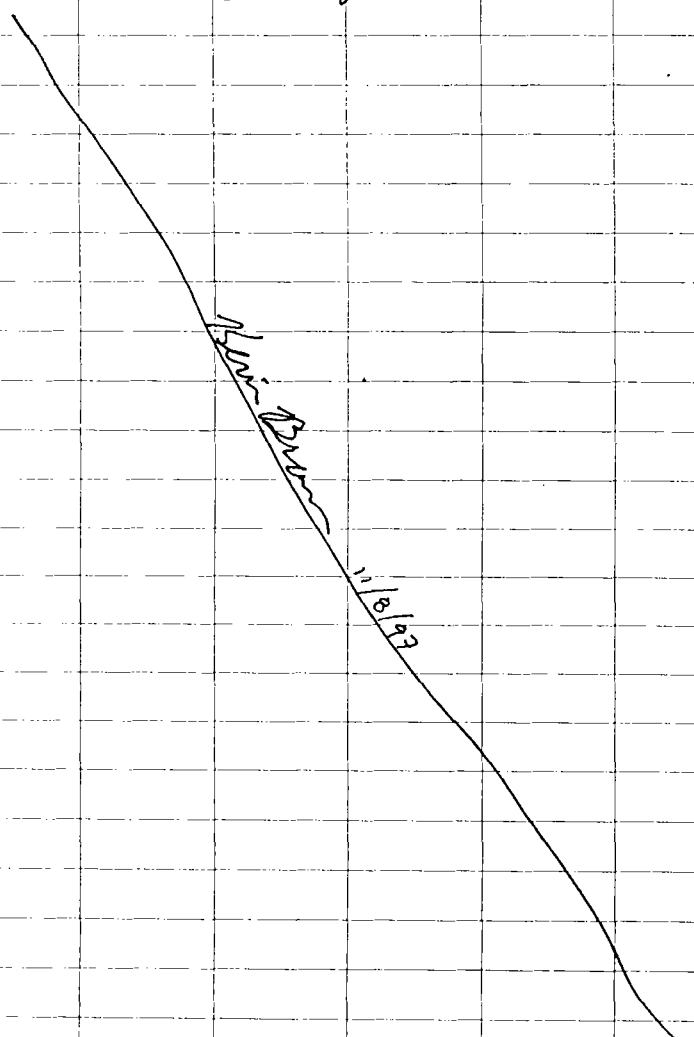
water and bringing up lots of sand and small crushed rock from the aquifer.
1400 - Still bringing up sand and rock.
1430 - Brown takes 2 pictures of the material coming out of the well.
1520 - Crew stops circulating water and drops a tape to check the level of the sand. It is at 44 ft b.g.s. which is the same level as before they began circulating.
1530 - Montgomery Watson calls their Proj Mngr. to discuss options.
1600 - They will attempt to circulate with mud to get the sand below the clay layer. Crew shovels sand from the circulation tub into a 55-gal. drum.
1615 - Crew is mixing mud to circulate.
1620 - Crew begins circulating mud through IW#1. Sand is coming out with the mud as it did before with the water.
1710 - Crew pulls the pipe out of the well and measures 52.6 ft to the sand from ground surface.

Keri Brown

11/8/97

1720- Crew plans to leave well as is overnight and check depth in the morning.

1730- Leave site for day.



Sunday 11/9/97

0700- Brown arrives on site. Weather is overcast, cold, low 40's °F. Crew is at IW1. Depth to sand is 52.6' b.g.s. Crew cannot lower the bottom of the packer below 45 ft b.g.s.

0745- Crew sets packer at 40 ft b.g.s. and runs a pressure test. Well took water, therefore water is going out through the perfs at the clay layer (45 ft b.g.s.) or below the clay layer (52 ft b.g.s.) but cannot tell which.

0830- Mike w/ Montgomery Watson calls his Project Manager to discuss options and then discusses options with Layne crew.

0930- Layne has a smaller diameter packer that they decide to try to use.

1040- Crew is lowering the smaller packer into IW1.

1050- Top of packer is set at 46 ft b.g.s. Packer is 2 ft. Below packer is 1 ft section then a 2 ft perforated pipe (1" dia).

1130- More sand is back in the well. Crew pulls out the packer to circulate more mud.

Kevin Brown

(92)

11/9/97

1155- Circulating mud in IW 1.

1245- Remove pipe from well and check depth. Depth is 53.9 ft b.g.s.

1305- Crew is lowering packer again. Set at 46 to 46.5 ft b.g.s.

1335- Circulation is established outside casing between perforations.

1340- Crew is mixing cement grout.

1430- Grouted up to approx. 5 ft b.g.s..

1450- Crew cleans up area around IW 1 and loads up equipment.

1530- Set up at IW 4.

1600- Ken with Sayre says they are just getting equipment set up at the well but are not doing anything down the well today. They are getting things set up to get an early start tomorrow.

1615- Leave site.

Kevin Brown 11/9/97

(93)

Monday 11/10/97

0730- Brown arrives on site. Weather is overcast and drizzling, high 30's. Crew is at IW 4. Just blasted 2nd set of 4 perforations at 24 ft bgs in the clay layer. The first set was at 34 ft b.g.s.

0745- Mike with Montgomery Watson measured to the bottom of the well. It is 57 ft b.g.s.

0820- Crew runs pressure test with top of packer set at 25 ft b.g.s. just below upper perforations.

0830- Communication outside casing is established.

0840- Crew removes packer to add more perforations in each zone.

0850- Crew lowers 6 perforating jets to the lower zone below the clay.

0855- Blasted perfs

0900- Crew rigged six more jets for the clay zone. Brown took picture of the 6 jets.

0905- Blasted perfs in clay zone.

0907- Mike measures bottom of hole at 56 ft bgs. Sayre is going to bring the bottom of the hole up to around 40 ft bgs with bentonite

Kevin Brown

11/10/97

before pumping grout. They add one + ½ bags of chips to IW4. Bottom at 43.2 ft b.g.s.

0915 - Brown tries to call Steve Mckricka in Chicago office, but Steve is not in.

0930 - Crew sets packer at 25 ft bgs and mixes grout.

0955 - Crew has completed pumping grout at IW4. Brown tries to contact Steve Mckricka and Sheri Bianchin but gets no answer.

1030 - Crew is at decon area preparing equipment for next well. Brown tries to call Steve again but no answer.

1040 - Crew arrives at IW2 and begins setting up.

1100 - Bottom of hole @ IW2 is 61 ft bgs. Clay bottom is @ 47 ft bgs. Crew sets up 4 jets to install perfs at 48 ft bgs.

1130 - Det off 4 jets at 48 ft bgs.

1140 - Rigged up 4 jets and set them to 42 ft bgs. Detonated charges.

1150 - Mike measures bottom of hole at 60.1 ft bgs.

1215 - Crew lowers top of packer to 46 ft bgs.

1220 - Crew rems pressure test. No communication

Kevin Brown

11/10/97

Will raise packer about a ft and re inflate.

1240 - Communication is established.

1250 - Pull packer out of well to make more perforations.

1320 - Crew measures bottom of hole. There is now material in the bottom up to about 46 ft bgs.

1355 - Crew sets off 6 perforating jets in the clay zone.

1430 - Crew is trying to flush out the sand in the bottom with mud.

1535 - Crew pulls pipe out of IW-2 and measures 55 ft bgs to bottom.

1550 - Crew prepares to blast 6 more perforations in the lower zone below the clay.

1555 - Detonation. Depth to bottom now 538 ft bgs.

1610 - Called Sheri Bianchin at EPA and left voice mail message updating her on site activities.

1630 - Ben with Sayre says it is getting too dark to use the crane to lower pipe through the roof of the bldg. They will continue tomorrow. Leave site.

Kevin Brown 11/10/97

11/11/97 Tuesday

0730- Bron arrives on site. Weather: partly cloudy, upper 20's. Crew is at IW-2. They have just set the packer at 45 ft bgs. Depth to bottom of hole was 54 ft bgs.

0750- Crew is mixing grout. Pump is clogged. Crew tries to clear.

0810- Crew clears pump and checks for circulation in well. Still have communication

0820- Crew resumes mixing grout.

0825- Crew is pumping grout into IW-2.

0830- Recirculating heavy grout. Crew stops pumping and deflates packer.

0845- Brown calls Steve Mrkvicka and updates him on progress.

0910- Crew is loading up equipment used at IW-2.

1030- Crew is unloading drums at drum staging area

1150- Crew is at IW-1 preparing to cut off casing. Crew cannot get a burn permit from the plant until 12:30. Brown checks SOP. Brown asks Mike if Layne is following SOP and cutting off casing 2 ft bgs. Mike said they

Keri Brown

11/11/97

were not planning on cutting casing off 2 ft bgs. Brown calls Steve Mrkvicka. Steve said he is not aware of any approved deviations from the SOP. Steve will try to contact Sterri Branchi of EPA to discuss and wants Brown to call back in a few minutes.

1215- Brown calls Mrkvicka back. Mrkvicka has not heard back from EPA. He said to get pictures and document what Layne does.

1240- Layne added less than a bag of chips to IW-1 to bring bentonite to about 1 ft bgs. Then cut casing off at 4 inches bgs.

1250- Brown took picture of well casing at 4 inches bgs.

1255- Brown took picture of cap on casing before welding.

1300- Layne welds cap on casing. Layne backfills hole with the soil that was removed from around the casing.

1310- Crew moves to IW-2 inside building and begins shoveling soil from around

Keri Brown

11/11/97

casing.

1320- Sayne is cutting off the casing at IW-2 about 4 inches below the concrete slab.

1330- Sayne adds bentonite chips to just below new top of casing which is 4 inches below slab. Sayne wells cap onto casing.

1340- Sayne cuts off 2 inch pipe located approx. 4 inches northwest of IW-2. Cut off approx 3 inches below slab.

1350- Drop tape measure down 2 inch pipe. Bottom on elbow at 36 inches bgs. Sayne adds bentonite chips to 2 inch pipe, then welds on metal cap. Brown takes picture of IW-2 and 2 inch pipe before welding cap on 2 inch pipe.

1355- Sayne backfills around casing with the soil that was removed from around casing.

1400- Crew moves to IW4. ACS brings backhoe to excavate down around well.

1415- Crew finds a 2 inch PVC line coming into the well from the north at approx. 4 ft bgs. Well casing is already sealed above 2 inch line. Brown takes picture of well and 2 inch line.

Kevin Brown

11/11/97

1420- Sayne cuts casing off 2 ft bgs. Sayne actually made a cut in the casing at 2 ft bgs then cut the casing off at 1.5 ft bgs because of the high water table. They did not want to weld standing in the water in the bottom of the hole. Brown takes picture of well casing and water in excavation.

1430- Sayne adds bentonite chips to just below tops of casing and welds on cap.

1440- Brown took picture of cap on casing at IW-4.

1445- Work complete. Brown calls Mukricka to update him on work done.

1500- Brown leaves logbook, camera, and cellular phone at treatment building and departs site per airport.

Kevin Brown 11/11/97

(112) SMWkl 12-18-97

0800 arrive at site. Crew goes to MW9 MW14 MW29 MW34 next.
0845 collect sample at MW9. Water is pink from dye used during the MW9 investigation. Purge @ MW14.
0915 Finish MW9 and MW14. Purge MW34.
1000 Done sampling MW34 and MW29. Go back to treatment building to pack samples.
1120 Go to MW21.
1155 Sample at MW21.
1230 Break for lunch.
1400 Crew back from lunch. Head to MW50.
1500 Done at MW50.
1530 Move to MW10C.
1610 Finish at MW10C. Leave site.

Carter Helm 2-8-98 (113)

0700 Report to ACS site
0720 Arrive at site, drillers setting up decon pad within fenced area of ACS facility - north end near drum & tank storage
0810 Drillers from Layne - Northcentral arrive in Wisconsin, Ken & Mark set up at Additives Well, IW-3. Thick grout tremied to ~50' bls to 40' bls - conducted during Phase I.
0845 Discuss SOP with Michael Hart, M-NAT. AT IW6 Drillers, during their initial visit, thought that electrical lines were not an issue but today they realize they are. This well many not be abandoned this shift - Plant cannot cut power to the boiler room till spring or summer. - According to Mike Hart, Pete Vogt will decide fate.
0905 Drillers mix a thick grout & tremie it in well to ~39' bls, & to 10' above the "cured" grout from Phase I

An RO Stinger TC-145 boom crane is utilized at IW-3

1005 AT IW-3 drillers begin to install packer assembly using crane boom. A 2" casing-open allows fluid transfer to reach below packer.

1010 Using Rig at IW-5, Vince & Mike set-up to begin a 3" coring around the 2" well to ~36' bls, then use 5" casing into clay to prevent any conduit between the aquifers

1040 Ken assembles plastic explosives in preparation to perforate well casing at IW-3. Explosives are wired & lowered with crane inside packer casing (2").

1050 Drillers first try to circulate the grout which was placed above old grout in IW-3. See figure on log-book page 117 for visual description

Base of clay ~ 35' bls. Packer at 33' bls - uninflated for right now - later to be inflated. Circulating grout below packer zone at first, with packer uninflated.

1110 Mark & Ken replace Hyd with grout in lower zone - evident by displacement flow from top-of-casing into mud-tub - which drillers eventually pump into temporary tank - then later to Treatment Plant.

1130 Ken prepares a 4-round string of explosives for IW-3

1150 First round of explosives set off at 36' bls at IW-3 below packer - following SOP

1200 Vince & Mike are now at 16' bls with the 3" core (IW-5). Strong odor present but No readings are indicated on Mike Hurt's HNu PID device, calibrated earlier.

(116) C Nfelin 2-8-98

1220 Ken & Mark need to water down the Thick grout to get better circulation - Pump is clogging, Ken prepares 2nd perforation

1240 2nd explosion set-off at 30' bls above packer - pr. 50 psi

31-33' bls is Packer elevation

base of clay @ 34.5' bls

If water circulation can be verified by rising ▽ Then drillers will inject grout - 1 annulus volume, at least, with a heavy grout mix.

1300 Circulation continued, static water level rising - right now, potable water being used to confirm circulation.

1355 Begin injecting grout thru packer-ed off zone

Annulus volume is noted as

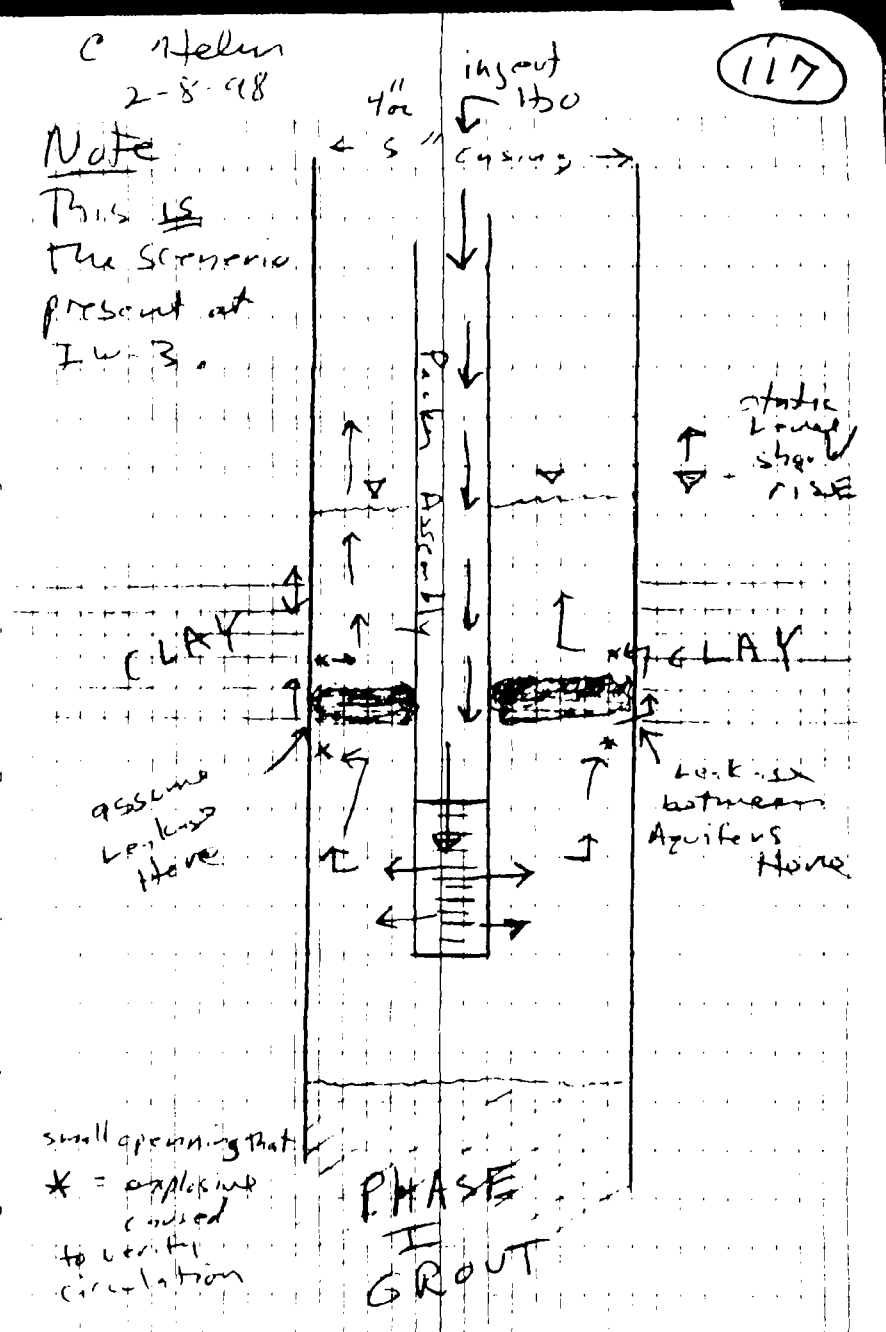
1.61 gal/foot for 5"

1.97 " " for 4"

1435 Grout consistency - of "return grout" is heavy - No more water left - well abandoned.

C Nfelin 2-8-98

(117)



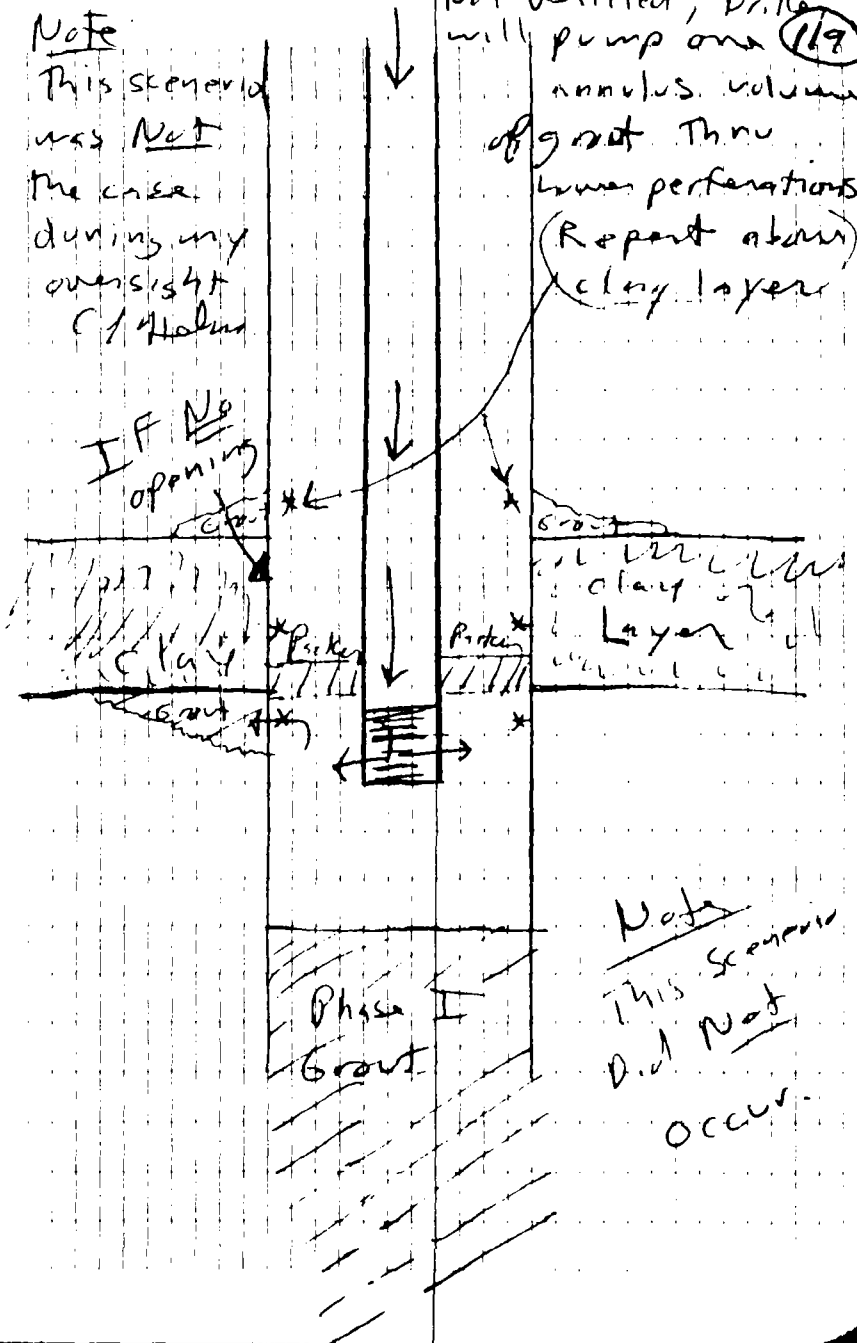
(118) C. Helm 2-8-98

Note (IF return grout is water-kept down)
1455 Packer assembly pulled, Taken to decon
1505 5" outer casing did not seal properly at 2W-5
Mike requests Not 8" surface T-casing to be used to ensure a tight fit into the 5" casing (in clay layer (at least 2' into clay - minimum)) for a closed system for rotary wash drilling to continue - I said "ok", Mike Hirt agreed.
1600 at 2' bls = top of clay
3" core to 30' bls - trying to get to base of clay layer
1605 5' casing is 2.4' into top of clay
1630 Drillers try to knock sump base out of 2" well but obstruction is in the way ~ 63' bls, cannot reach well base
1700 Start area clean-up, lock down + leave rig
1715 over 1W 5. Report sate.

C. Helm

C. Helm 2-8-98

Note
This scenario was Not the case during my oversight
C. Helm



IF water circulation Not verified, Driller will pump one (119) annulus volume of grout Thru lower perforations (Report above) clay layer

Note
This scenario Did Not occur.

(120)

2-9-98 C Helm

0715 Arrive at DCS site
Drillers setting back -V at IW-5, mike thinks was HNu
0800 11 Nu reading in IW 5 when we back ground = ~0 ppm
0815 Still trying to perforate bottom of well w/ tremie pipe (empty)
but Use of the 2" (1 3/4") pipe only moved the obstruction ~2' further into well (could not reach bottom of well
Layne & Montgomery - Watson decided to use explosive charges to "create a man-made screen" since The obstruction has blocked off the original well screen (~2' opening) - see SOP IV. F. 4 - which allows perforation to allow grout circulation - via use of explosives

Note: Driller helper "Mike" has a bad cough + dizziness - starting last night Michael recommends a hospital visit since odors were present at IW-5 yesterday.

(121)

2-9-98 C Helm

0915 While Vince + Michael recon the Griffith Landfill well, MW 35 which will be abandoned later today, Ken & Mike prepare plastic explosive charges to be used ~67' bls in IW-5, obstruction is now at ~64' 4" bls to 68' 3" bls
0930 Vince & Mark are cutting (with a torch) the protective top of MW 35 - & risers below the crimp while Ken & Mike set off one charge at IW-5 ~67' 6" bls
0944 charge is set off at 62' 4" bls
HNu readings at top of borehole - 0 ppm
1000 explosion left 12' of debris and sand above perforated location, Michael told drillers No more perforation for fear of flowing sand problem - just flush hole w/ water - slowly adding grout & continue with F, steps 5 in SOP

1020 Grouting complete in LW-5
1025 Drillers attempt to pull up 2" well per SOP
we have problems extracting well
3" coring was done yesterday to 30' SLS, Drillers could not yank or pull 2" well up - Michael has asked them to 3" core 5 to 10' more then try again to pull up well
1110 3" coring begins again
1200 3" coring ends at 45' SLS
Drillers will re-try to extract the 2" well.
1300 To get a better "grip" on the 2" well stick-up will allow more torque since well riser too long for rig tongs
1315 Need to torch (cut) part of well
Hot-work permit required, work stops till HCS is notified & HCS technician accompanies "hot work"
1420 Drillers torch cut the 2" well riser ~ 2' of length as well is lifted up in length

1500 After 3-4 torch cuttings, drillers get to well screen 1 to 1.5" dia PVC (clogged) w/ small slot openings
1615 Drillers begin to mix a thick grout & tremie it to be form of borehole Per SOP. Problems in well removal The formation expanded the 2" well ~ 2' above the screen + Expansion greater than 3" diameter - is reason Drillers could not slip 2" well thru 3" temporary casing. Perf & core bit hung-up on each other. Reason for torch cutting and simultaneous well & 3" casing removal as well - see photos 13 & 14 for clarification
1645 Begin to clean up area - Finish grouting - water displacement containerized.
1720 Depart site.

(124) 2-10-98 C Ntelm

0700 Finish decon activities from LW 5, prepare mw 9R surface casing decon it)

0755 Set up at the mw-9R Location, south of Treatment Bldg but north of Railroad Tracks used by ACS facility

810 At 12' with off set mw-9. drillers HSA to 18.0' bls Note clay layer encountered at 16.5' bls at this locale.

835 Drillers take a uni-piece 6" carbon steel permanent casing in borehole & drive it to 20.1' bls - for a good seal into the clay layer. HSA augers are 10.25" I.D. Casing set at 18' bls for a good seal

950 Begin to mix grout to set 6" casing for mw-9R Premix heavy grout around outside of casing as 10" HSA's are lifted out-per SOP direction.

2-10-98 C Ntelm (125)

0952 Core Time begins for surface casing - clean-up begins

1010 Drillers move rig to set up over old mw-9 to prepare to use core barrel over existing 2" well.

1020 Drillers & equipment go to decon before coring starts over mw-9 well

1030 Call Steve Markwick, RVPM to update him - he needs copies of logbook from Qtly well sampling

1045 Call Steve Bischin ESA RPM update him on this weeks progress & schedule

1100 Go to Copy/fax center to get Steve his copies.

1130 Drillers back on mw-9, cut hole in pro-top - but could not remove pro-top - cemented in.

1200 Drillers return with 5" core barrel - to core around pro top to remove it. Using the 5" core barrel will not effect aquifer zones - contamination

1230 After 5' of 5" coring Pro-top still won't move, We believe that cement was poured between 2" well and 3" Pro-top cover.

1245 Drillers continue 5" coring just outside Pro-top

1330 ProTop is freed, rain starts, Drillers begin coring, following SOP procedures

1400 → 1500 took EPA 734 to Chevy Dealership - Problems with steering / front-end. Get inspection for safety reasons.

1520 At MW-9 continue 3" core to base of clay per SOP Rotary wash method used.

1630 Drillers at 16' bls with 3" core barrel. Base of clay at 25' bls, coring continues around 2" well.

1725 Getting too dark to continue drillers will remove well tomorrow & grout them

C J Helm

0710 40°F, Raining extremely hard today, 3" core to 31' bls around the 2" stainless well MW-9 (5' more)

0805 Drillers remove 2" stainless 35' well MW-9, Then move to Decon prior to MW-9R drilling.

Note Michael Hird informs me of Driller Mike's condition: released from hospital yesterday, chest x-rays show "linear atelectasis" = lung pocket scarring from past or present pneumonia all blood work = OK, illness is apparently NOT site-related

0900 Well has 10' screen set at 35' bls & was twisted / mangled during coring

1000 Call Steve Markecki, BUPH & Sherri Bianchin, EPA RPM to inform them of progress & Mike's medical prognosis.

1110 Drilling resumes at MW-9R Thru the grouted permanent casing installed yesterday, Grout hydration time (cure time) was satisfied per SOP Reqs. (24 Hours +)

Use of hammering 4" casing w/ 3.5" roller bit operating inside + circulation off drilling mud. Drilling stuck at 20.1' bls.

1245 Drillers delayed at ~28' bls due to the clay layer binding the 3.5 tri-cone roller bit, which plugs up circulation — drillers must stop to withdraw roller bit & manually remove clay to free-up rollers before drilling resumes. A slow drilling process from continuous Plus cold

1310 Bladder Pump problems need propane torch to thaw out pumps + hose consuming. These Pumps are essential for circulation & grout pumping.

1350 Drillers finally out of clay layer base of which is at 25' bls.

Drillers switch from drilling mud to water.

1400 2nd & last bladder/diaphram pump has broken down. drilling at 26' bls

I mention a descripency between old MW-9 with a 5' screen & new MW-9R which SoP calls for a 10' screen. Michael wants to keep well depth identical (at 35' bls) + in which case a 10' screen will reach into base of clay — Not good. I recommend use of a 5' stainless screen at 35' bls. Michael departs side to call Pete Vogt for SoP variance.

1415 Michael tells me that Pete Vogt does want a 10' screen. I therefore ask Michael to lower total well depth to at least 36' bls so that screen (and sand pack) will have at least a foot of linear distance from each other. He complies.

(130)

2-11-98 C Helm

I'm also uneasy with well construction annulus of 1" - bridging potential (2" well built inside the 4" temporary casing) But they are following the approved SOP Section I., C., Pg. 3

1510 Michael tells me that Pete Vogt called back to say to set the well at 37' bls - 2 ft sand pack will now separate top of screen & base of confining clay layer - alleviating my concerns

1525 Drillers shear off a section of 3" temporary casing - delay to replace this piece

1555 Drillers at 37.2' bls & withdraw the 3½" tricone bit

1600 Assemble well and (bit) 1st measure casing & screen lengths - manufacturer is Johnson, 10 slot, stainless steel.

2-11-98 C Helm (131)

1615 Begin sand pack placement within 4" casing, drillers constantly measure, w/ down hole tape measure, the top of sand pack to safeguard against bridging - my request

1700 Sand at 24.8' bls, drillers begin to mix grout, pure bentonite slurry - as thick as the rig can pump it per SOP direction.

Note During the drilling of MW-9R approximately 200 gallons were "lost to formation" especially when the sand from Bower aquifer was encountered.

1730 Depart site.

C Helm

(132) C Helm 2-12-98

0715 On site, check grout settling at MW-9R only 2.5' bls.

0805 Inform Ben & Lee at Treatment bldg of a possible media (newspaper) visit scheduled for today according to Steve Mikucki's conversation w/ Sheri Blackman. Reporter, Levi Harvey, from The Times may show up.

0830 Drillers still at Decon - all vehicles are very muddy.

915 Drillers return from Decon station and set-up over MW-54 in preparation to abandon it. Very wet and muddy - but no rain predicted.

0935 Support Truck & Trailer stuck in mud.

0955 Use of Slinger, R.O. boom crane to position vehicles

1030 Finally set-up over old MW-54

1040 Torch-cut 6" outer casing of old MW 54 to get a better grasp of 2" stainless well riser

C Helm 2-12-98 (133)

1050 Old MW-54 easily withdrawn from within 6" outer casing per SOP.

1055 Hole collapsed to 8' bls with grout - as predicted by SOP.

1120 Begin Hollow Stem Augering over the 6" permanent casing as prescribed in SOP, section II, Part A, page 2. (11/18/97 rev.) Small Annular space noted.

1205 After attaining 16.2' bls with the 10.5" HSA's, drillers easily remove the 6" outer casing - to be replaced with 8" outer casing per SOP.

1318 New 8" outer casing back from decon - one piece only

1400 8" casing set firmly in clay to 18.8' bls. Begin mix of grout 1st

1515 Drillers complete grouting the 10" 8" outer casing - cure time (overnight) begins HSAs completely removed

1530 Move used drilling equipment to decon station.

(134) 2-12-98 C Helm

1545 Re-mobilize to MW 9R locale
Protective cover set at MW 9R - 4' bls
1605 chips and bentonite powder used to stabilize pro-top cover, well locked.
1615 Sand placed between 2" well & pro-top.
1715 Depart site

(135) 2-13-98 C Helm

0705 At site, continue at MW-54R. Auger down to 38' bls thru surface casing set at MW-54R yesterday.
0840 Attain 38' bls, allowing a one foot sand base.
0905 Drillers steam clean old MW-54 well screen & riser - they will need to add an additional 10' casing length for proper stick-up height - old well condition is good, integrity not compromised by removal.
1000 well re-assembled, bottom of 10-foot screen set at 37' bls -
Sand base - 1' (37-38' bls)
└ Global Bond Filter Sand #5 is first used - The drillers do a slow-pour of sand pack.
1035 Sand pack to 32' bls, continue sand pack placement at least 2' over

(136) 2-13-98 C Helm

screened interval

1105 Sand (Coarse #5) to 26' b/s, Mike Hirt requests 1 to 2' of fine sand above sand pack, Drillers slowly pour fine sand in MW to 24.5' b/s. Begin mixing heavy grout to remain above sand-pack. 5% bentonite to 95% cement mixture @ 13 #'s/s

1210 Mobilize to MW 35 in Griffith Landfill, take measurements @ 20.2' b/s depth to total and 11.1' b/s to water table

1300 Begin to mix Cement bentonite grout need longer tremie pipe to reach 20' b/s in order to displace water in well.

1330 Done at MW 35, drillers will return later to weld a steel plate across well & surface casing.

2-13-98 C Helm (137)

Note: Development of MW-9R and MW-54R will not occur this shift, Mike Hirt is to arrange it in the near future.

1335 Drillers top off grout at well locales, weld steel plates, & other house-keeping duties I depart site.

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Serving the World's Environmental Needs

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 1
Date: 11-02-97 Time: 0905
Photographer: Steve Mrkvicka
Description: Looking north at pump being pulled from IW-3.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 2
Date: 11-02-97 Time: 0905
Photographer: Steve Mrkvicka
Description: Another photo looking north at pump being pulled from IW-3.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 3
Date: 11-02-97 Time: 1005
Photographer: Steve Mrkvicka
Description: Looking south at caliper tool installed at IW-3.

(1)

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 4
Date: 11-02-97 Time: 1105
Photographer: Steve Mrkvicka
Description: Looking north at downhole logging at IW-3. Caliper was done first followed by the gamma tool.

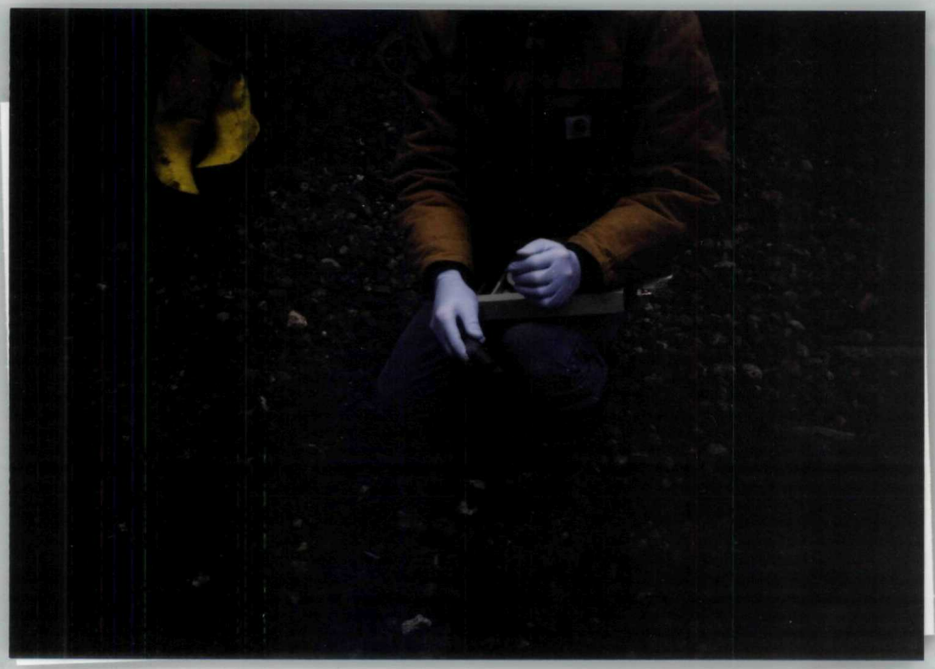
(2)

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 5
Date: 11-02-97 Time: 1115
Photographer: Steve Mrkvicka
Description: Pulling pump from IW-2 located inside building.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 6
Date: 11-02-97 Time: 1515
Photographer: Steve Mrkvicka
Description: Looking at packer assembly that is being lowered into IW-3.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 7
Date: 11-03-97 Time: 1010
Photographer: Steve Mrkvicka
Description: Looking at geophysical logging at IW-1, which is located near railroad tracks at southern end of the active facility or Onsite Containment Area.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 8
Date: 11-03-97 Time: 1350
Photographer: Steve Mrkvicka
Description: Looking at television logging at IW-1.



Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 9
Date: 11-03-97 Time: 1415
Photographer: Steve Mrkvicka
Description: Looking at material at end of a probe that was inserted into IW-5. There was a clay soft obstruction at about 9.9 feet below the top of the well casing.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 10
Date: 11-04-97 Time: 0845
Photographer: Steve Mrkvicka
Description: Looking southwest at well purging before sampling at IW-4.

(13)

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 11
Date: 11-04-97 Time: 1350
Photographer: Steve Mrkvicka
Description: Looking at bailing of IW-6 before sampling.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 12
Date: 11-07-97 Time: 0815
Photographer: Steve Mrkvicka
Description: Drilling crew is mixing a cement and bentonite slurry to be used to grout at IW-4. Slurry is mixed in the tub before it is pumped through a tremie pipe into the well.

(11)

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 13
Date: 11-07-97 Time: 1100
Photographer: Steve Mrkvicka
Description: Grout is pumped into IW-2.

(91)

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 14
Date: 11-08-97 Time: 0840
Photographer: Kevin Brown
Description: Perforating jet with detonator about to go into IW-1.

(17)

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 15
Date: 11-08-97 Time: 1430
Photographer: Kevin Brown
Description: Material coming up from IW-1. Crew circulates water through perforations to clean out coarse materials such as sand and rock.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 16
Date: 11-08-97 Time: 1430
Photographer: Kevin Brown
Description: Another photo of the material coming up from IW-1. Crew circulates water through perforations to clean out coarse materials such as sand and rock.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 17
Date: 11-10-97 Time: 0900
Photographer: Kevin Brown
Description: Six perforating jets about to go into IW-4.

20

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 18
Date: 11-11-97 Time: 1250
Photographer: Kevin Brown
Description: Looking at IW-1. Well casing is cut about 4 inches below ground surface. SOP and Indiana well abandonment code calls for casing to be cut 2 feet below ground surface. Montgomery Watson is notified that any changes to the SOP need to be approved through EPA and IDEM.

21

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 19
Date: 11-11-97 Time: 1255
Photographer: Kevin Brown
Description: Looking at cap on casing at IW-1 before being welded on.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 20
Date: 11-11-97 Time: 1330
Photographer: Kevin Brown
Description: Looking at IW-2 casing, which is cut off at about 4 inches below the floor slab. IW-2 is located inside a boiler room. Bentonite pellets were added into the well. Two inch pipe located about 4 inches northwest of IW-2 is cut off about 3 inches below floor slab.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 21
Date: 11-11-97 Time: 1340
Photographer: Kevin Brown
Description: Cap being welded onto IW-2 casing.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 22
Date: 11-11-97 Time: 1415
Photographer: Kevin Brown
Description: Looking at IW-4 well casing. Backhoe used to excavate around casing to a depth of about 4 feet below ground surface. Note 2 inch PVC line coming into the well from the north. Casing had been sealed above entry point of the 2 inch line.

(22)

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 23
Date: 11-11-97 Time: 1415
Photographer: Kevin Brown
Description: Another photo looking at IW-4 well casing. Backhoe used to excavate around casing to a depth of about 4 feet below ground surface. Note 2 inch PVC line coming into the well from the north. Casing had been sealed above entry point of the 2 inch line.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 24
Date: 11-11-97 Time: 1440
Photographer: Kevin Brown
Description: Cap welded onto top of IW-4 casing.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 1
Date: 2-08-98 Time: 0905
Photographer: Carter Helm
Description: North view of Layne Northwest Drillers mixing a thick cement-bentonite grout prior to pumping the grout in order to establish grout circulation in the lower zone of IW-3 above the Phase I-placed grout but below the packer assembly.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 2
Date: 2-08-98 Time: 1125
Photographer: Carter Helm
Description: A close-up view of the stainless steel weights which will sink the explosive charges in IW-3. The string of explosives will be lowered through the 2-inch packer assembly riser to create 1/2 inch perforation holes at established depths to aid circulation of fluids.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 3
Date: 2-08-98 Time: 1130
Photographer: Carter Helm
Description: Northwest view of the Layne RO Stinger TC-145 boom crane used to lower packer assemblies or to extract surface casings or well materials.

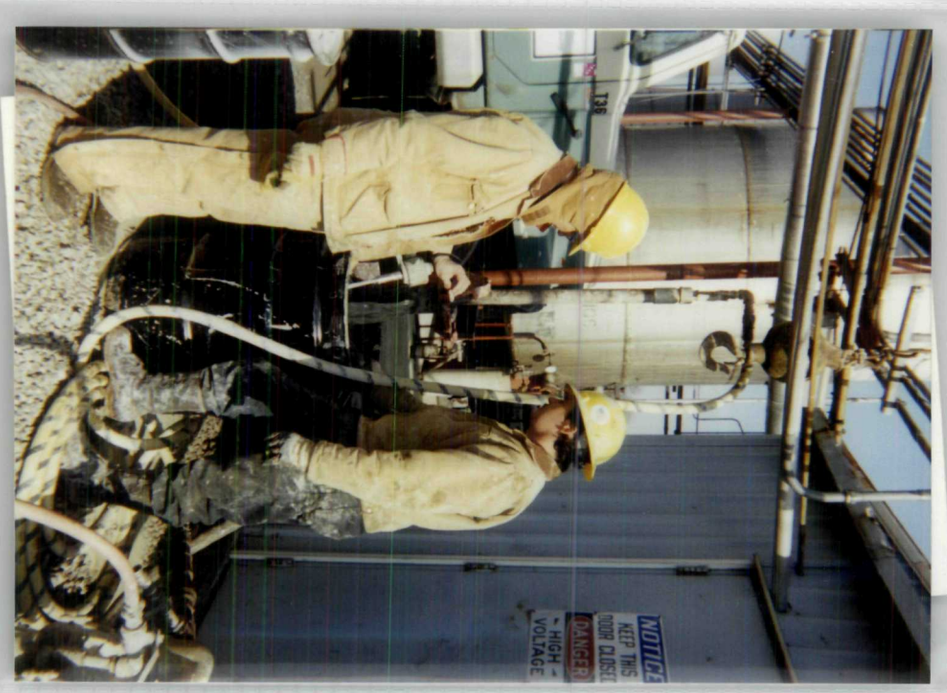
Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #:4
Date: 2-08-98 Time: 1145
Photographer: Carter Helm
Description: Close-up view of the string of four plastic explosive charges to be detonated at 36 feet below land surface (bls) in IW-3 (for perforation of 2 inch well riser/casing).

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 5
Date: 2-08-98 Time: 1150
Photographer: Carter Helm
Description: Closeup view of the detonator device and fire wire used by Layne drillers to set off charges down hole.

(4)

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 6
Date: 2-08-98 Time: 1205
Photographer: Carter Helm
Description: North view of drillers using a 3 inch core barrel to overdrill the existing well at IW-5. Rotary wash method is being utilized. Circulation using mud tub in foreground.

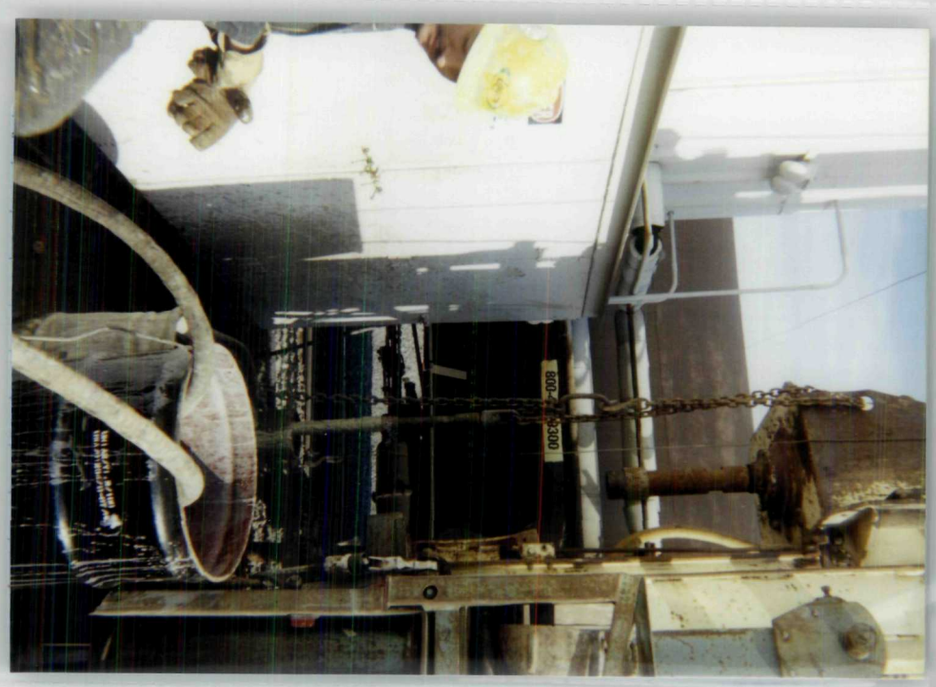
Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 7
Date: 2-08-98 Time: 1215
Photographer: Carter Helm
Description: North view of the IW-5 exclusion zone. Note the close proximity of the high voltage electrical panel on the east side of the ACS blending building. Also note the railroad tank car located a few feet to the north of the work area.. Strong odors were noted during IW-5 drilling.



Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 8
Date: 2-08-98 Time: 1415
Photographer: Carter Helm
Description: Northeast view of drillers pumping grout, tremie method, down through the packer assembly at IW-3. Note the close proximity to the high voltage electrical shed. Area power was turned off for the day's field activities at ACS.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 9
Date: 2-08-98 Time: 1450
Photographer: Carter Helm
Description: North view of the packer assembly after it was extracted from IW-3. The packer is inflated using nitrogen gas for a tight seal within the casing.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #:10
Date: 2-09-98 Time: 0805
Photographer: Carter Helm
Description: Montgomery-Watson's Geologist Michael Hirt monitors the IW-5 work area (exclusion zone) for volatile organics using a PID device (HNu). Readings did not exceed background levels.



Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 11
Date: 2-09-98 Time: 1025
Photographer: Carter Helm
Description: North view of drillers attempting to extract the ACS production well IW-5. By using the drill rig's head and chains, the drillers were unable to remove the 2 inch well from the 3 inch temporary core casing set around the well.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 12
Date: 2-09-98 Time: 1320
Photographer: Carter Helm
Description: North view of Montgomery-Watson's Geologist Michael Hirt monitoring the IW-5 work area (exclusion zone) for volatile organics using a PID device (HNu). Readings again did not exceed background levels.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 13
Date: 2-09-98 Time: 1520
Photographer: Carter Helm
Description: Close-up view of the perforation created by the plastic explosive at 63 feet bls in IW-5. Unfortunately, the explosion expanded the 2 inch well bigger than the 3 inch core barrel that the well was to be extruded from (through). This is the reason the well could not be pulled through the 3 inch core casing surrounding it.

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Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #:14
Date: 2-09-98 Time: 1645
Photographer: Carter Helm
Description: Close-up view of the extracted ACS production well IW-5. On the left is the 2 inch carbon steel well riser or casing; on the left (attached to the riser) is a portion of the old PVC 1.5 inch well screen with clogged slot openings.

(91)

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 15
Date: 2-10-98 Time: 0811
Photographer: Carter Helm
Description: West view of drillers using 10.25 inch inside diameter hollow stem augers (HSA) to drill down to the confining clay layer, approximately 16.5 feet bls, in preparation to set 6 inch surface casing for later drilling of MW-9R (after 24 hours - allowing grout to set). Notice the old MW-9 in foreground, to be abandoned next.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 16
Date: 2-10-98 Time: 0955
Photographer: Carter Helm
Description: A close up view of the recently grouted 6 inch surface casing for MW-9R. A minimum 24-hour wait period ensues prior to drilling to continue (through clay layer and into the lower aquifer).

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 17
Date: 2-11-98 Time: 0805
Photographer: Carter Helm
Description: An east view of drillers using the drill rig head with straps to extrude the damaged MW-9 well from its surface casing.

(19)

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 18
Date: 2-11-98 Time: 1012
Photographer: Carter Helm
Description: A close up view of the surface casing for MW-9R, just prior to drilling through it to reach the lower aquifer without creating a conduit for potential contamination to travel from the upper to the lower aquifer.

(20)

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 19
Date: 2-11-98 Time: 1020
Photographer: Carter Helm
Description: South view of two surface casings, foreground casing is for the new MW-9R; background casing is the former MW-9 casing soon to be abandoned.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 20
Date: 2-11-98 Time: 1050
Photographer: Carter Helm
Description: Close up view of the abandoned MW-09 screen and casing. Notice the mangled riser/casing, which was caused by the rotating action of the 3 inch core barrel while over-coring around the well.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 21
Date: 2-11-98 Time: 1605
Photographer: Carter Helm
Description: Close up view of drillers assembling the new MW-9R prior to sand pack placement. This well was set at 37 feet bls.

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Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 22
Date: 2-11-98 Time: 1625
Photographer: Carter Helm
Description: Close up view of the construction of MW-9R. Here the sand pack is slowly poured to avoid bridging of sand, Global brand, #5 sized sand was used. Top of sand pack was measured to 24.8 feet bls, 2.2 feet above the top of the screen satisfying SOP directives. Notice the constant use of a down hole tape measure (yellow in photo), drillers always knew where the top of their well materials lie, and could avoid bridging.

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Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 23
Date: 2-12-98 Time: 1043
Photographer: Carter Helm
Description: North view of drillers using a torch to cut the 6 inch outer casing from the original MW-54. Reducing the casing 'stick-up' allowed the drillers to better grasp the 2 inch well during well removal and its subsequent abandonment.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 24
Date: 2-12-98 Time: 1050
Photographer: Carter Helm
Description: North view of drillers extracting the former MW-54 2 inch monitoring well used the drill rig's head and straps following SOP guidelines. The well was easily removed.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 25
Date: 2-12-98 Time: 1230
Photographer: Carter Helm
Description: Northeast view of hollow stem augers in MW-54's borehole just after the 6-inch surface casing was extracted and before its replacement with an 8-inch outer surface casing, closely following the MW-54 well abandonment SOP guidelines. Scattered in the foreground is the remaining is the former MW-54 well screen and riser (on left) to be later decontaminated and reused for MW-54R, and the extracted 6-inch surface casing (center and right).

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Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 26
Date: 2-12-98 Time: 1510
Photographer: Carter Helm
Description: A close up view inside the hollow stem augers at MW-54R. Notice the small annular space (< 1 inch) between the inside diameter of the HSA's and the outside diameter of the new 8-inch surface casing which has just been driven into the clay layer and grouted.

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Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 27
Date: 2-12-98 Time: 1630
Photographer: Carter Helm
Description: Southwest view of the recently installed protective outer casing at surrounding the MW-9R monitoring well. The well was subsequently secured using a padlock.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 28
Date: 2-13-98 Time: 1000
Photographer: Carter Helm
Description: North view of drillers constructing MW-54R prior to the sand pack placement around its 10-foot stainless steel screen.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 29
Date: 2-13-98 Time: 1100
Photographer: Carter Helm
Description: North view of sand pack installation between the well and the surface casing at MW-54R. Drillers slowly poured Global filter sand to avoid bridging in the annulus space.

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Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 30
Date: 2-13-98 Time: 1205
Photographer: Carter Helm
Description: Close-up view of the just completed MW-54R. Once the grout settles and cures, the well riser stick-up will be cut to meet SOP height requirements and to allow the installation of a locking protective plate over the 8 inch surface casing.

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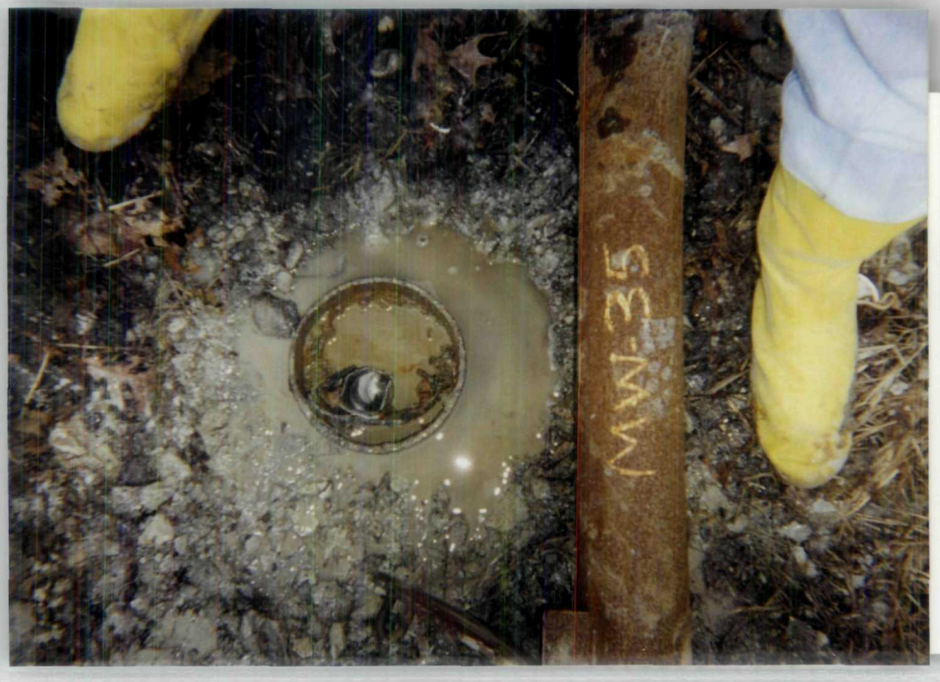

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 31
Date: 2-13-98 Time: 1325
Photographer: Carter Helm
Description: downward view of the recently grouted MW-35, located in the Griffith Municipal Landfill. Grout was tremied from 90 feet bls to 1 foot bls. Drillers returned later to weld a steel plate across the surface casing at ground level, completing abandonment procedures at MW-35.

Site: American Chemical Services, Inc. RD/ERA
Proj. #: 46517/46518
Roll: 1 Photo #: 32
Date: 2-13-98 Time: 1430
Photographer: Carter Helm
Description: Southwest view of drillers pumping the grout displaced groundwater from the abandoned wells into the PGCS treatment building following spoils management SOP guidelines.